

DIVISION 13 – SPECIAL CONSTRUCTION
SECTION 13121 – Pre-Engineered Timber Column Structure

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pre-Engineered factory and field fabricated Timber Column Structure 54'x52'x14'ht
- B. Prefinished metal roofing and siding panels
- C. Prefinished metal trim items
- D. Prefinished soffits
- E. Pre finished gutters and downspouts

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. None

1.03 RELATED SECTIONS

1.04 REFERENCE STANDARDS

- A. Preservative Treated Lumber
 - 1. American Wood Protection Association (AWPA)
 - a. Commodity Specification C2 (2001), Preservative Treatment By Pressure Processes
 - b. Use Category System U1, User Specification for Treated Wood
 - c. UC4A (Important Structural – Ground Contact)
 - d. UC4B (Structural Support – Ground Contact)
 - e. Items treated under AWPA standards shall bear the quality mark of an independent testing agency or service
 - 2. International Code Council Evaluation Service (ICC-ES)
 - a. Items treated under ICC-ES reports shall meet or exceed the applicable standard and shall bear the quality mark of an independent testing agency or service
 - 3. Federal Specification TT-W-571-J.
- B. Framing Lumber
 - 1. Lumber Grading Rules and Wood Species
 - a. National Design Specification for Wood Construction, current edition
 - b. Northeastern Lumber Manufacturer's Association, Inc. (NELMA)
 - c. Southern Pine Inspection Bureau (SPIB)
 - d. West Coast Lumber Inspection Bureau (WCLIB)
 - e. Western Wood Products Association (WWPA)
- C. Wood Trusses
 - 1. All lumber used in the design of wood trusses shall be kiln dried to maximum 19% moisture content and graded in accordance with the current grading rules. Design stresses allowed are those listed in the current editions of the respective Lumber Association's grading rules.
 - 2. The design of wood members shall be in accordance with the formulas published in the 2001 edition of the National Design Specification for Wood Construction.
 - 3. Light metal toothed connector plates and joint design shall conform to specifications as set forth in the 2002 edition of Truss Plate Institute's Design Specification for Metal Plate Connected Wood Trusses (TPI-2002).
 - a. Connector plates shall be fabricated in accordance with applicable ICC-ES standards.

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4. Truss members and joints shall be designed in accordance with TPI-2002. All truss designs shall be accompanied by complete and accurate shop drawings and contain the following information:
 - a. Slope or depth, span and spacing of the truss
 - b. Heel bearing height
 - c. Design loading to include:
 1. Top chord live load
 2. Top chord dead load
 3. Bottom chord dead load
 4. Concentrated loads and their points
 - d. Adjustments to lumber and plate design values for conditions of use
 - e. Plate type, thickness of gauge and size
 - f. Lumber size, species and grade for each member

1.05 SYSTEM DESCRIPTION

- A. Clear span
- B. Bay spacing of
- C. Primary framing
 1. Columns
 2. Trusses
 3. Wind bracing
- D. Secondary framing
 1. Perimeter baseboards and preservative treatment
 2. Wall girts
 3. Purlins
 4. Overhang rafters and fascia
 5. Ancillary blocking or furring as required
- E. Roof Covering
 1. Prefinished ribbed metal panels
 2. Other roof coverings as required
- F. Wall Covering
 1. Prefinished ribbed metal panels
 2. Other wall coverings as required

1.06 DESIGN REQUIREMENTS

- A. Roof Design Loads
 1. Top Chord Live Load: (15.9 PSF)
 2. Top Chord Dead Load: (4 PSF)
 3. Bottom Chord Dead Load: (0 PSF)
 4. Bottom Chord Point Loads: (NONE)
 5. Unbalanced Snow Loads: (NONE)
- B. Wind Speed
 1. 90 MPH (V3s). Exposure "B"
- C. Roof and wall system shall be able to withstand the imposed loads with maximum allowable deflection of L/180.

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- D. Assembly shall permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.
- E. Size and fabrication of wall and roof systems to be free of distortion or defects that would be detrimental to appearance or performance.

1.07 SUBMITTALS

- A. Provide four (4) sets of the following bearing the seal of a Professional Engineer, registered in the State of (Tennessee)
 - 1. Complete and detailed shop and erection drawings showing size and location of each part and component, certifying that the building design meets specified roof and wind loading requirements
 - 2. Truss engineering analysis and design data, including the following:
 - a. Axial forces and bending moments for each member
 - b. Basic plate design value
 - c. Design analysis of each joint showing that proper plates have been applied
 - 3. Manufacturer's standard color chart

1.09 QUALITY ASSURANCE

- A. Fabricate members in accordance with standard industry practice

1.10 QUALIFICATIONS

- A. Contractor shall have a minimum of twenty years documented experience in the manufacture and erection of this type of structure.
- B. Design structural components under direct supervision of a Professional Engineer experienced in design of this work and licensed in the State (Tennessee).
- C. Employ adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper and safe performance of the work.
- D. Contractor shall be responsible for all materials, whether furnished by himself or a subcontractor, and proper storage of the same.
- E. Contractor must be licensed and show proof of workmans comp insurance.

1.11 REGULATORY REQUIREMENTS

- A. Contractor shall be responsible for compliance with all applicable building codes and ordinances covering the work.
- B. Contractor shall cooperate with regulatory agencies or authorities to provide data as requested.

1.12 PRE-CONSTRUCTION MEETING

- A. A pre-bid/response conference is required before contract is awarded so contractor can have site inspection.
- B. A pre-construction meeting will convene no later than one week prior to commencing work.

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1.13 FIELD MEASUREMENTS

- A. Field measurements shall be taken to verify that components match shop drawings.

1.14 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store prefabricated components (trusses, columns, steel panels and other items) so that they will not be damaged or deformed.
- B. Stack materials on platforms, pallets or other structures covered with tarpaulins or other suitable weather-tight ventilated covering. Handle and store structural parts in a manner that will avoid deforming members or subjecting parts to excessive stresses.
- C. Store roofing and siding panels to allow water to drain freely.
- D. Panels shall not be stored in contact with other materials that may cause staining or discoloration.

1.15 PROJECT CONDITIONS

- A. All aspects of Construction to be completed within 6 months of contract being awarded unless contract period is extended and agreed upon by all parties.
- B. Fit carpentry work to other work. Scribe and cope as required for accurate fitting.
- C. Correlate location of furring, nailers, blocking and supports to allow for attachment of other work.
- D. Site prep (clearing land, building up pad) to be done by TWRA.

1.16 CERTIFICATIONS

- A. In order for the bidder's proposal to be considered, the following certifications shall be tendered with the bid forms:
 - 1. Certification of the sheet steel supplier stating:
 - a. Minimum thickness of metallic coating steel in decimal inch
 - b. Identification of all metallic coatings
 - c. Coating weight range
 - d. Verification that material supplied is in conformance with applicable ASTM standard as stated in the technical specification
 - 2. Certification of paint supplier stating:
 - a. Generic chemistry of exterior side topcoat
 - b. Percentage of polyvinylidene difluoride (PVDF) in resin
 - 3. Certification of sheet steel coater stating:
 - a. Nominal paint film thickness in mils (one mil equals one thousandth of an inch)
 - 4. Certification of treated lumber stating:
 - a. Preservative type
 - b. Preservative retention in the wood (pounds per cubic foot of wood)
 - c. Depth of assay zone
 - d. Compliance of preservative and its retention in wood with AWP or ICC-ES standards
 - 5. Warranty
 - a. Sample copy of warranty to be issued at completion of project
 - b. Verification that warranty meets or exceeds the requirements stated in the technical specification
- B. Failure to supply the required submittals will result in the bidder's proposal being rejected as non-responsive.

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1.17 WARRANTY

- A. The building manufacturer shall supply a warranty to the Owner which shall provide that the manufacturer will:
1. For a period of fifty (50) years:
 - a. Absorb repair or replacement costs, including materials and labor, if any preservative treated lumber fails due to decay or insect attack
 - b. Repair, or at its discretion, replace free of charge the building framework, including roofing and/or siding panels, if directly damaged by snow loads.
 2. For a period of thirty-five (30) years:
 - a. Repaint any roofing or siding panel on which, under conditions of normal weather, the paint has separated from the panels due to flaking or peeling.
 - b. Repaint any roofing or siding panels on which, under conditions of normal weathering, chalking greater than a rating of 8 (ASTM D4212 Method 'A') or color change greater than five (5) units (ASTM D2244) has occurred.
 3. For a period of ten (10) years:
 - a. Repaint any roofing or siding panel on which, under conditions of normal weather, exhibit corrosion resulting in red rust greater than 1/2 inch from any sheared edge which is clearly visible in casual observation.
 4. For a period of five (5) years:
 - a. Repair, or at its discretion, replace free of charge the building framework, including roofing and/or siding panels, if directly damaged by wind loads, unless damage is caused by flying or falling objects.
 - b. Repair any roof leaks due to defects in materials or workmanship.
 5. For a period of one (1) year:
 - a. Repair other building parts that prove to be defective in materials or workmanship.
 6. The manufacturer shall not be liable for damage due to deterioration caused by interior chemical vapors and/or dust, deterioration from proximity to salt water body or aggressive exterior atmosphere, damage by flying or falling objects, or collateral damage to interior walls, ceiling, partitions, equipment and/or contents, or cost of preparation of the site.

PART 2 PRODUCTS

2.01 INSULATION

1. All exterior walls and roof ½" heavy duty thermax or equivalent.

2.02 MATERIALS – FRAMING

- A. Columns
1. Lower portion
 - a. Factory fabricated from minimum 3-ply No. 1 SYP
 - b. The area in contact with the ground shall be pressure treated with a wood preservative to a net retention of 0.8 pounds per cubic foot of wood and kiln dried after treating to 19% maximum moisture content.

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- c. The wood preservative shall be Chromated Copper Arsenate Type “C” (Oxide type) as listed in Federal specification TT-W-571J and compliant with USEPA Guidelines.
 - d. The preservative shall penetrate 100% of the sapwood.
 - e. The treated portion of the column shall be laminated with stainless steel nails.
- 2. Upper portion
 - a. Factory fabricated from minimum 3-ply No. 1 SYP
 - b. Attach upper column to lower column with appropriate number and size of pneumatically driven fasteners.
 - c. Provide factory or field installed blocking on outside face of column between nailers.
- B. Wood Trusses
 - 1. Lumber
 - a. Top Chord: Southern Yellow Pine of size and grade to meet design requirements
 - b. Bottom Chord: Southern Yellow Pine of size and grade to meet design requirements
 - c. Webs: Southern Yellow Pine of size and grade to meet design requirements
 - 2. Trusses shall be constructed of surfaced lumber (S4S) and compliant with SPIB visual and structural grade requirements
 - 3. Plates: Connector plates shall meet design requirements and shall be compliant with applicable ICC-ES standards and specifications
 - 4. Design and fabricate trusses and connections to withstand snow, wind and all dead loads.
 - 5. Fabricate trusses in plant, using mechanical or hydraulic fixtures as required to bring members into contact. Install plates in accordance with manufacturer’s instructions.
- C. Baseboards
 - 1. 2” x 8” No. 1 Southern Yellow Pine with 1/2” x 7/16” notch
 - 2. Pressure treated with wood preservative to a retention in compliance with applicable AWWA or ICC-ES standards and specifications and kiln dried after treatment to 19% maximum moisture content
 - 3. Preservative shall penetrate 100% of sapwood.
- D. Wall girts
 - 1. First nailer (girt) above baseboard: 2” x 6” No. 2 or better Spruce-Pine-Fir (SPF) with 1/2” x 3/4” notch in bottom.
 - 2. Balance of nailers: 2” x 4” 2100 MSR (minimum) SPF.
 - 3. Overhang top nailer: 2” x 6” No. 2 or better SPF.
- E. Purlins and truss ties
 - 1. 2” x 4” No. 2 or better SPF
- F. Overhang framing
 - 1. Provide factory fabricated rafter frames.
 - 2. Provide 2” x 6” No. 2 or better SPF factory beveled fascia boards.
- G. Wind bracing
 - 1. 2” x 6” No. 2 or better SPF from endwall column to first truss back.
- H. Framing around openings
 - 1. 2” x 4” No. 2 or better SPF around personnel doors.
 - 2. 2” x 6” No. 2 or better SPF around overhead door openings
- I. Headers
 - 1. Provide built-up headers as required for proper installation.
- J. Incidental Framing
 - 1. 2” x 4” and/or 2” x 6” No. 2 or better SPF
- K. Interior framing

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1. 2" x 4" No. 2 or better SPF

2.03 MATERIALS – PREFINISHED METALS

- A. Roofing panels (Fluoroflex 1000®) or equivalent.
 1. Panel substrate shall be 0.019" minimum thickness commercial steel sheet with G90 (zinc) coating per ASTM A653 or AZ55 (aluminum/zinc) coating per ASTM A792.
 2. The weather side of the panel shall receive a nominal two tenths mil polyurethane primer and a nominal eight tenths mil topcoat of 70\$ polyvinylidene difluoride (PVDF) resin to achieve a total nominal paint film thickness of one mil.
 3. Color selection of siding panels shall be from the manufacturer's standard color chart.
 4. The non-weather side paint system shall consist of a two coat finish with a total nominal thickness of one-half mil.
- B. Siding Panels (Fluoroflex™ 1000) or equivalent.
 1. Panel substrate shall be 0.019" minimum thickness commercial steel sheet with G90 (zinc) coating per ASTM A653 or AZ55 (aluminum/zinc) coating per ASTM A792.
 2. The weather side of the panel shall receive a nominal two tenths mil polyurethane primer and a nominal eight tenths mil topcoat of 70\$ polyvinylidene difluoride (PVDF) resin to achieve a total nominal paint film thickness of one mil.
 3. Color selection of siding panels shall be from the manufacturer's standard color chart.
 4. The non-weather side paint system shall consist of a two coat finish with a total nominal thickness of one-half mil.
- C. Wainscot Panels (Fluoroflex™ 1000) or equivalent.
 1. Panel substrate shall be 0.019" minimum thickness commercial steel sheet with G90 (zinc) coating per ASTM A653 or AZ55 (aluminum/zinc) coating per ASTM A792.
 2. The weather side of the panel shall receive a nominal two tenths mil polyurethane primer and a nominal eight tenths mil topcoat of 70\$ polyvinylidene difluoride (PVDF) resin to achieve a total nominal paint film thickness of one mil.
 3. Color selection of siding panels shall be from the manufacturer's standard color chart.
 4. The non-weather side paint system shall consist of a two coat finish with a total nominal thickness of one-half mil.
- D. Metal Trim Items (Fluoroflex™ 1000) or equivalent.
 1. Die-formed steel from the same quality material as the siding panels

2.04 MATERIALS – OTHER

- A. Corner bracing
 1. Provide 1-1/4" wide high tensile steel strapping in all unobstructed corners in an "X" configuration.
- B. Roofing and siding fasteners
 1. EPDM washered, painted, center drive stainless steel screws for ribbed steel panels
- C. Closure strips
 1. Closed cell foam.
- D. Sealant
 1. 100% neutral curing silicone sealant, and paintable sealant where required.
- E. Overhead doors, two 14x12 on east and west walls, one 16x12 on north wall. All insulated with electric openers.
- F. Windows, 9 lite vinyl double hung with low E and argon. 3040 (36"x48")

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- G. Walk in doors, standard metal 3068 9 Lite insulated metal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify site conditions under provisions of Section 01015.

3.02 ERECTION – FRAMING – GENERAL

- A. Erect framing in accordance with manufacturer's established construction procedures.
- B. Make all components and building plumb, square, straight and true to lines, according to industry standards (See 3.08).
- C. Provide adequate temporary bracing to assure structure remains plumb and square until permanent bracing is installed.
- D. Altering of structural members will not be permitted.

3.03 ERECTION – FRAMING

- A. Lower Column
 - 1. Auger a hole to depth (48" minimum) with diameter as required by the building manufacturer.
 - 2. Install 1-1/4" x 1-1/4" galvanized support stilts on base of lower column using the specified number of 2" stainless steel positive placement gun nails, per corner.
 - 3. Accurate position lower column in the hole, embedding stilts 3/4" into soil.
 - 4. Place ready-mix concrete in hole to footing size and thickness indicated on plans.
 - 5. Backfill with dry soil, compacted in 8" lifts.
 - 6. Remove excess portions of lower column to provide 18" staggers beginning 18" above grade.
- B. Upper Column
 - 1. Set upper column to positive interlock with lower column.
 - 2. Install manufacturer's recommend quantity and size pneumatically driven fasteners.
- C. Baseboards (Columns in Ground)
 - 1. Install 2" x 8" treated plank, at grade, using builder's recommended fasteners.
- D. Wall girts
 - 1. Install 2" x 6" notched nailer to receive OSB panel.
 - 2. Install 2" x 4" nailers with on-center spacing as shown on building plans.
 - 3. Install 2" x 6" overhang nailer at the top.
- E. Trusses
 - 1. Set trusses in plane with the center member of the upper column using lifting methods as approved by the manufacturer.
 - 2. When properly positioned, install two 1/2" diameter machine bolts and manufacturer-recommended 20d ring shank nails through two of the upper column laminates and the truss heel.
 - 3. Brace trusses as recommended by the manufacturer.
- F. Purlins
 - 1. Install 2" x 4" purlins at 24" on-center (maximum) and attached to trusses with 60d ring shank nails.
- G. Wind bracing

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1. Install 2" x 6" angled bracing at locations recommended by the manufacturer.
- H. Incidental framing
 1. Install 2" x 4" or 2" x 6" blocking as required according to building manufacturer's recommendations.

3.04 ERECTION – PREFINISHED MATERIALS – GENERAL

- A. Roofing Panels
 1. Install panels perpendicular to supports, aligned straight with end fascia
 2. Fasten panels to purlins with screw fasteners.
- B. Siding and wainscot panels
 1. Install panels perpendicular to supports, aligned level and plumb to industry standards (See 3.08).
 2. Fasten panels to wall girts with screw fasteners.
- C. Trim items
 1. Install trim items at the base, wainscot transition, corners, top of steel siding, fascia, gables and ridge using appropriate fasteners.
- D. Vent-A-Ridge or equivalent ridge vent
 1. Install over ridge trim using screw fasteners.
 2. Insure that a minimum of 2" clear throat opening is maintained.
- E. Soffits
 1. Install soffits to interlock with trim items at top of steel siding and at fascia.
 2. Use solid soffit at end overhang.
 3. Use a combination of solid and perforated soffits to provide balanced ventilation at side overhangs.
- F. Gutter and downspouts
 1. Install gutters with spikes and ferrules (with washers) spaced 24" on-center.
 2. Silicone sealant and silicone rubber gaskets shall be used at laps to maintain leak prevention and to relieve stress due to thermal movement.
- G. Filler strips
 1. Provide closed cell foam filler strips at the top and bottom of the roofing panels. F. Gutter and downspouts

3.08 TOLERANCES

- A. Framing Members
 1. 1/4" from level.
 2. 1/8" from plumb
- B. Siding and roofing
 1. 1/8" from true position